CLAIMS

1. Protein characterized in that it comprises or is constituted by:

– the sequence SEQ ID NO: 1,

– or any sequence derived from the sequence SEQ ID NO: 1, in particular by substitution, suppression or addition of one or more amino acids, providing that said derived sequence binds to phosphate,

– or any sequence homologous to the sequence SEQ ID NO: 1, preferably having a homology of at least approximately 80% with the sequence SEQ ID NO: 1, providing that said homologous sequence binds to phosphate,

– or any fragment of one of the sequences defined above, providing that said fragment binds to phosphate, in particular any fragment being constituted by at least approximately 20 contiguous amino acids in the sequence SEQ ID NO: 1.

2. Protein according to claim 1, characterized in that it comprises or is constituted by:

– the sequence SEQ ID NO: 2 or SEQ ID NO: 3,

– or any sequence derived from the sequence SEQ ID NO: 2 or SEQ ID NO: 3, in particular by substitution, suppression or addition of one or more amino acids, providing that said derived sequence binds to phosphate,

– or any sequence homologous to the sequence SEQ ID NO: 2 or SEQ ID NO: 3, preferably having a homology of at least approximately 80% with the sequence SEQ ID NO: 2 or SEQ ID NO: 3, providing that said homologous sequence binds to phosphate,

– or any fragment of one of the sequences defined above, providing that said fragment binds to phosphate, in particular any fragment being constituted by at least approximately 20 contiguous amino acids in the sequence SEQ ID NO: 2 or SEQ ID NO: 3.

3. Nucleotide sequence encoding a protein as defined in claim 1 or 2.

4. Recombinant vector, in particular plasmid, cosmid, phage or virus DNA, containing a nucleotide sequence according to claim 3.

5. Recombinant vector according to claim 4, containing the elements necessary for the expression in a host cell of the polypeptides encoded by a nucleotide sequence according to claim 3, inserted into said vector.

6. Host cell, chosen in particular from bacteria, yeasts, fungi cells, plant cells or mammal cells, said host cell being transformed using a recombinant vector according to one of claims 4 or 5.

7. Pharmaceutical composition comprising as active ingredient a protein according to claim 1 or 2, in combination with a pharmaceutically acceptable vehicle.

8. Pharmaceutical composition according to claim 7, comprising as active ingredient a protein represented by the sequence SEQ ID NO: 2 or SEQ ID NO: 3.

9. Pharmaceutical composition according to claim 8, in which the protein as defined in claim 1 or 2, in particular SEQ ID NO: 2 or SEQ ID NO: 3, is in combination with a variant of the paraoxonase protein, in particular SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10 or SEQ ID NO: 11.

10. Use of a protein according to claim 1 or 2, in particular the protein represented by the sequence SEQ ID NO: 2 or SEQ ID NO: 3, for the preparation of a medicament intended for the prevention or treatment of arthritis or diseases linked to hyperphosphataemia, such as cardiovascular diseases, or, in combination with a variant of the paraoxonase protein, in particular SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10 or SEQ ID NO: 11, within the framework of the prophylaxis or treatment of intoxications caused by insecticides or nerve agents such as soman, VX, sarin or tabun, or within the framework of the treatment of atherosclerosis.

11. Combination product comprising at least one protein according to claim 1 or 2, in particular SEQ ID NO: 2 or SEQ ID NO: 3, and at least one variant of the paraoxonase protein, in particular SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10 or SEQ ID NO: 11, for

simultaneous or separate use, or use spread over time, intended for the prophylaxis or treatment of intoxications caused by insecticides or nerve agents such as soman, VX, sarin or tabun.

12. Assay method of the protein according to claim 1 or 2, in particular SEQ ID NO: 2 or SEQ ID NO: 3, characterized in that it comprises the following stages:

– rabbit monoclonal antibodies directed against different epitopes of the protein according to claim 1 or 2, in particular SEQ ID NO: 2 or SEQ ID NO: 3, are fixed to a plate and the human serum to be analyzed containing said protein is applied to the above-mentioned plate,

– the plate is rinsed and washed,

– antibodies directed against rabbit antibodies marked with peroxidase are applied to the plate over 30 minutes, in order to form a ternary complex between a rabbit monoclonal antibody, said protein and an above-mentioned antibody directed against a rabbit antibody,

– the plate is rinsed and washed,

– the peroxidase fixed to the plate is reacted with its substrate and the reaction is stopped at the end of 30 minutes with 3,3',5,5'-tetramethylbenzidine,

– the optical density of the product formed in the preceding stage is measured at 450 nm using a spectrophotometer, and comparison of this measurement with a standard curve makes it possible to determine the concentration of the protein according to claim 1 or 2, in particular SEQ ID NO:2 or SEQ ID NO: 3 present in the serum.

13. Application of the assay method according to claim 12

to the *in vitro* diagnosis of diseases linked to hyperphosphataemia in particular when the quantity of protein according to claim 1 or 2, in particular SEQ ID NO: 2 or SEQ ID NO: 3, assayed according to the method of claim 12, is less than the quantity of this protein normally present in the blood of a healthy individual, or

to the *in vitro* diagnosis of diseases linked to hypophosphataemia in particular when the quantity of protein according to claim 1 or 2, in particular SEQ ID NO: 2 or SEQ ID NO: 3, assayed according to the method of claim 12, is greater than the quantity of this protein normally present in the blood of a healthy individual, or

to the *in vitro* diagnosis of an individual's predisposition to such pathologies.

14. Application according to claim 13 to the *in vitro* diagnosis of diseases linked to hyperphosphataemia such as cardiovascular diseases, in particular cardiovascular diseases linked to the formation of atheroma plaques, or to the *in vitro* diagnosis of an individual's predisposition to develop one of the above-mentioned diseases.

15. Application according to claim 14 to the *in vitro* diagnosis of diseases linked to hypophosphataemia, or to the *in vitro* diagnosis of an individual's predisposition to develop one of the above-mentioned diseases.